

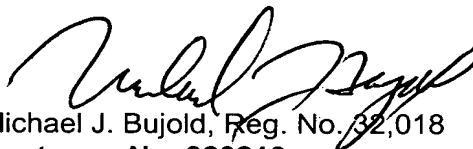
REMARKS

Accompanying this Preliminary Amendment, please find a Substitute Specification which overcomes the informalities noted in the original specification. The undersigned avers that the enclosed Substitute Specification only includes the changes which are indicated on the accompanying enclosed Marked-Up Specification and does not contain any new subject matter.

Newly entered claims 11-20 merely rewrite the subject matter of original claims 1-10 in a more traditional U.S. claim format. The entered amendments are not, in any way, directed at distinguishing the present invention from any known prior art. Please consider the newly entered claims upon consideration of this application.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,



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[001] WHEEL DRIVE

[002] This application is a national stage completion of PCT/EP2005/000486 filed ♦♦
January 19, 2005 which claims priority from German Application Serial ♦♦
No. 10 2004 006 722.8 filed February 11, 2004. ♦♦

[003] FIELD OF THE INVENTION ♦♦

[004] According to the kind defined in detail in the preamble of claim 1, the invention relates to a wheel drive.

[005] BACKGROUND OF THE INVENTION ♦♦

[006] Wheel drives, particularly one-wheel power packs for industrial lift trucks, generically have one prime mover which, via a reduction gear, drives the drive wheel and a steering motor by way of a drive wheel that can turn a steering axle around to perform a steering motion. The installation space for the wheel drive and the steering mechanism is extremely limited here.

[007] DE 34 20 [[164]]146 A1 discloses a wheel drive for an industrial lift truck ♦♦
where one drive wheel is actuated via a reduction gear by a prime mover and a steering motor, via a chain, can turn the drive wheel around a steering axis of rotation so as to perform a steering motion. The steering motor is separately placed here next to the traction motor whereby a large installation space is needed.

[008] The problem on which this invention is based is to provide a wheel drive, in particular for an industrial lift truck, in which the traction motor actuates the vehicle wheel and the wheel drive is rotatably actuatable via a steering motor around a steering axis of rotation and which is compactly and economically constructed.

[009] ~~———— The problem is solved by a generic wheel drive having the characteristic~~ ♦♦
~~features of the main claim.~~ ♦♦

[010] SUMMARY OF THE INVENTION ♦♦

[011] According to the invention, the traction motor, the steering motor and the brake, which brakes the wheel drive, are co-axially disposed. The brake is

preferably between the traction motor and the steering motor. By using a steering gear, which preferably is likewise situated co-axially relative to the steering motor, it is possible to use a compact steering motor.

[012] In another development of the invention, the traction motor, the brake and the steering motor are located in a common housing whereby a further reduction of installation space needed is possible and an economical solution is obtained.

[013] In one other development of the invention, the brake is designed as so-called negative brake whereby the brake is actuatable by spring tension in closing direction and by hydraulic pressure or electric actuation of a magnetic coil, it can be actuated in opening direction. The brake can be designed as friction disc brake, it being possible to place the friction linings either in one space filled with lubricant, or also to design it as dry-operating disc brake without lubricant.

[014] In another development, the drive shaft of the traction motor is connected via engaging gears with a part, the so-called brake hub, which is connected with the rotating parts of the brake. The engaging gears can also be designed via a fitting key.

[015] In one other development of the invention, the brake designed as a negative brake is actuatable in closing direction via cylindrical pressure springs or via a plate spring.

[016] In another development of the invention, the drive shaft of the steering motor is connected with an inner central wheel of a planetary transmission or is designed integrally therewith which is in operative connection with planetary gears. The planetary gears are in operative connection with a first hollow gear and a second hollow gear, one of the hollow gears being non-rotatably connected with the vehicle chassis and the other hollow gear with the output wheel. Both hollow gears having different number of teeth, the planetary transmission is designed as a Wolfrom drive whereby, upon rotation of the inner central wheel, the drive wheel rotates around its steering axis thus performing a steering motion.

[017] BRIEF DESCRIPTION OF THE DRAWINGS ◆◆

[018] ~~Other features are to~~ The invention will now be understood from the ~~description described, by way of the Figures showing example, with reference to~~ the accompanying drawings in which: ◆◆

[019] FIG. 1 is a view of the whole wheel drive;

[020] FIG. 2 is a detailed cutout of a half section of the wheel drive where the brake, the steering motor and the steering gear are shown;

[021] FIG. 3 is a partial cutout in the half section of the wheel drive where the brake, the steering motor and the steering gear are shown;

[022] FIG. 4 is a cutout in the half section of the wheel drive where the brake, the steering motor and the steering gear are shown, and

[023] FIG. 5 is a cutout in the half section of the prime mover where the brake, the steering motor and the steering gear are shown.

[024] DETAILED DESCRIPTION OF THE INVENTION ◆◆

[025] FIG. 1:

One prime mover 1 preferably designed as electric motor drives via an drive shaft 2, a first spur gear 3 of a reduction gear 4. The first spur gear 3 drives a second spur gear 5 which, via a bevel gear (not shown) drives an output 6 of the wheel drive which is connected with a drive wheel 7. A second prime mover 8 drives, via a drive shaft 9, an inner central gear 10 of a planetary gear 11, which is designed as a Wolfram transmission. Planets 12 mesh with a first hollow gear 13 and a second hollow gear 14, the first hollow gear 13 being non-rotatably supported in a cover 15 non-rotatably connected with a part of the vehicle chassis. The second hollow gear 14 is non-rotatably connected with a cover 16 non-rotatably connected with a housing 17 whereby the rotation of the second hollow gear 14 turns the housing 17 in direction of a steering motion. A steering gear 18 is located between the reduction gear 4 and the second prime mover 8. A brake 19 is situated between the first prime mover 1 and second prime mover ~~[[2]]~~ 8. The first prime mover 1, the second prime mover ~~[[2]]~~ 8, the

brake 19 and the steering gear 18 are co-axially disposed. The drive shaft 2 is connected with rotating parts 20 of the brake 19.

[026] FIG. 2:

The drive shaft 2 of the first prime mover 1 is non-rotatably connected with a hub 21, which is non-rotatably connected with the rotating parts 20 of the brake 19. A pressure plate 22 is pressed by the tension of springs 23 on the rotating parts 20 whereby the brake is actuated in an engaging direction. By electric actuation of electric magnets 24, the pressure plate 22 is detached from the rotating parts 20 whereby the brake is actuated in a disengaging direction.

[027] FIG. 3:

The drive shaft 2 of the first prime mover 1 is connected via a fitting spring 25 with the hub 21. The hub 21 is connected with the rotating part 20 of the brake 19. Due to the tension of a plate spring 26, the pressure plate 22 is pressed on the rotating part 20 whereby the brake is actuated in an engaging direction. By pressurization of a piston 27, via an inlet 28, the pressure plate 22 is detached, via a tappet 29, from the rotating part 20 whereby the brake is actuated in the disengaging direction.

[028] FIG. 4:

The drive shaft 2 of the first prime mover 1 has engaging gears 30 by way of which rotating parts 20, the so-called brake discs, are non-rotatably connected. The brake, like the brake in FIG. 3, is actuated via the plate spring 26 in the engaging direction and by hydraulic pressurization via the inlet 28 in the disengaging direction.

[029] FIG. 5:

The brake, according to FIG. 5, corresponds to the brake, according to FIG. 2, the rotating part 20 being non-rotatably connected via engaging gears 30 with the drive shaft 2.

Reference numerals

| | |
|-----------------------|--------------------|
| 1 first prime mover | 16 cover |
| 2 drive shaft | 17 housing |
| 3 first spur gear | 18 steering gear |
| 4 reduction gear | 19 brake |
| 5 second spur gear | 20 rotating parts |
| 6 output | 21 hub |
| 7 drive wheel | 22 pressure plate |
| 8 second prime mover | 23 springs |
| 9 drive shaft | 24 electric magnet |
| 10 inner central gear | 25 fitting spring |
| 11 planetary gear | 26 plate spring |
| 12 planets | 27 piston |
| 13 first hollow gear | 28 inlet |
| 14 second hollow gear | 29 tappet |
| 15 cover | 30 engaging gears |